LEGIONELLOSIS

DISEASE REPORTING

In Washington

DOH receives 8 to 21 reports of legionellosis per year; an average of 2 deaths are reported to be associated with *Legionella* infections each year.

Outbreaks in the US have been associated with sources of aerosolized warm water, including air conditioner cooling towers, building and cruise ship water systems, hot spas, fountains, hot tubs, medical respiratory devices, humidifiers, showers, and sinks.

Purpose of reporting and surveillance

- To identify sources of transmission (e.g., a contaminated water source) and to prevent further transmission from such a source.

Reporting requirements

- Health care providers: notifiable to Local Health Jurisdiction within 3 work days
- Hospitals: notifiable to Local Health Jurisdiction within 3 work days
- Laboratories: no requirements for reporting
- Local health jurisdictions: notifiable to DOH Communicable Disease Epidemiology within 7 days of case investigation completion or summary information required within 21 days

CASE DEFINITION FOR SURVEILLANCE

Clinical criteria for diagnosis

Legionellosis is associated with two clinically and epidemiologically distinct illnesses: Legionnaires' disease, which is characterized by fever, myalgia, cough, pneumonia, and Pontiac fever, a milder illness without pneumonia.

Laboratory criteria for diagnosis

- Isolation of *Legionella* from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluids, or
- Demonstration of a fourfold or greater rise in the reciprocal immunofluorescence antibody (IFA) titer to ≥ 28 against *Legionella pneumophila* serogroup 1 between paired acute- and convalescent-phase serum specimens, or
- Detection of *L. pneumophila* serogroup 1 in respiratory secretions, lung tissue, or pleural fluid by direct fluorescent antibody testing, or

- Demonstration of *L. pneumophila* serogroup 1 antigens in urine by radioimmunoassay or enzyme-linked immunosorbent assay.

Case definition

- Confirmed: a clinically compatible case that is laboratory confirmed.

  The previously used category of "probable case," which was based on a single IFA titer, lacks specificity for surveillance and is no longer used.

A. DESCRIPTION

1. Identification

An acute bacterial disease with two currently recognized, distinct clinical and epidemiologic manifestations: Legionnaires' disease and Pontiac fever. Both are characterized initially by anorexia, malaise, myalgia and headache. Within a day, there is usually a rapidly rising fever associated with chills. Temperatures commonly reach 39-40.5ºC (102-105ºF). A nonproductive cough, abdominal pain and diarrhea are common. In Legionnaires' disease, a chest radiograph may show patchy or focal areas of consolidation that may progress to bilateral involvement and ultimately to respiratory failure; the case-fatality rate has been as high as 39% in hospitalized cases of Legionnaires' disease; it is generally higher in those with compromised immunity.

Pontiac fever is not associated with pneumonia or death; patients recover spontaneously in 2-5 days without treatment; this clinical syndrome may represent reaction to inhaled antigen rather than bacterial invasion.

Diagnosis depends on isolation of the causative organism on special media, its demonstration by direct IF stain of involved tissue or respiratory secretions, or detection of antigens of *Legionella pneumophila* serogroup 1 in urine by RIA or by a fourfold or greater rise in IFA titer between an acute phase serum and one drawn 3-6 weeks later.

2. Infectious Agent

Legionellae are poorly staining, Gram-negative bacilli that require cysteine and other nutrients to grow in vitro. Eighteen serogroups of *L. pneumophila* are currently recognized; however, *L. pneumophila* serogroup 1 is most commonly associated with disease. Related organisms, including *L. micdadei*, *L. bozemanii*, *L. longbeachae* and *L. dumoffii*, have been isolated, predominantly from immunosuppressed patients with pneumonia. In all, 35 species of *Legionella* with at least 45 serogroups are currently recognized.

3. Worldwide Occurrence

Legionellosis is neither new nor localized. The earliest documented case occurred in 1947; the earliest documented outbreak in 1957 in Minnesota. Since then, the disease has been identified throughout North America, as well as in Australia, Africa, South America and Europe. Although cases occur throughout the year, both sporadic cases and outbreaks are recognized more commonly in summer and autumn. Serologic surveys suggest a prevalence of antibodies to *L. pneumophila* serogroup 1 at a titer of 1:128 or greater in 1%-20% of the general population in the few locations studied. The proportion of cases of community acquired pneumonias that are due to *Legionella* ranges between 0.5% and 5.0%.

Outbreaks of legionellosis usually occur with low attack rates (0.1%-5%) in the population at risk. Epidemic Pontiac fever has had a high attack rate (about 95%) in several outbreaks.

4. Reservoir

Probably primarily aqueous. Hot water systems (showers), air conditioning cooling towers, evaporative condensers, humidifiers, whirlpool spas, respiratory therapy devices and decorative fountains have been implicated epidemiologically; the organism has been isolated from water in these, as well as from hot and cold water taps and showers, hot tubs and from creeks and ponds and the soil from their banks. The organism survives for months in tap and distilled water. An association of Legionnaires' disease with soil disturbances or excavation has not been clearly established.

5. Mode of Transmission

Epidemiologic evidence supports airborne transmission; other modes are possible, including aspiration of water.

6. Incubation period

Legionnaires' disease 2-10 days, most often 5-6 days; Pontiac fever 5-66 hours, most often 24-48 hours.

7. Period of communicability

Person to person transmission has not been documented.

8. Susceptibility and resistance

Illness occurs most frequently with increasing age (most cases are at least 50 years of age), especially in patients who smoke and in those with diabetes mellitus, chronic lung disease, renal disease or malignancy; and in the immunocompromised, particularly those who are receiving corticosteroids or who have had an organ transplant. The male to female

ratio is about 2.5:1. The disease is extremely rare in those under 20 years of age. Several outbreaks have occurred among hospitalized patients.

B. METHODS OF CONTROL

1. Preventive measures:

Cooling towers should be drained when not in use, and they should be mechanically cleaned periodically to remove scale and sediment. Appropriate biocides should be used to limit the growth of slime forming organisms. Tap water should not be used in respiratory therapy devices. Cost-effective preventive guidelines for domestic water systems have not been established; maintaining hot water system temperatures at 50ºC (122ºF) or higher may reduce the risk of transmission.

2. Control of patient, contacts and the immediate environment:

a. Report to local health authority.
b. Isolation: None.
c. Concurrent disinfection: None.
d. Quarantine: None.
e. Immunization of contacts: None.
f. Investigation of contacts and source of infection: Search (households, business) for additional cases due to infection from a common environmental source. Initiate an investigation for a hospital source should a single confirmed nosocomial case be identified.
g. Specific treatment: Erythromycin appears to be the agent of choice; the newer macrolides, clarithromycin and azithromycin, may be effective. Rifampin may be a valuable adjunct but should not be used alone. Experience with fluoroquinolones is encouraging but limited. Penicillin, the cephalosporins and the aminoglycosides are ineffective.

3. Epidemic measures

Search for common exposures among cases and possible environmental sources of infection. Decontamination of implicated sources by chlorination and/or superheating water supplies has been effective.

4. International measures

None.